

Alerts, Notices, and Case Reports

Unusual Vaginal Laceration Due to a High-Pressure Water Jet

JOSEPH P. RAMOS, MD
DALE CARRISON, DO, FACEP
DAVID L. PHILLIPS, MD
Las Vegas, Nevada

WITH THE GROWING popularity of water sports, the number of water-related injuries, not surprisingly, continues to increase annually. In 1994, 6,906 injuries were reported to the US Coast Guard.¹ The increased number of personal watercraft on lakes, a lack of experience and proper training, inadequate personal protective devices, and alcohol use are just a few of the factors responsible for the increasing number of injuries.¹ Lake Mead National Recreation Area, near Las Vegas, Nevada, is the National Parks Services most-visited park and the leading area for water-related injuries (Glenn Anderson, EMS Director, National Parks Services, Lake Mead; personal communication, January 1996). We report a unique case of an injury involving a personal watercraft at Lake Mead.

Although vaginal injuries related to the "water-ski douche" have been reported by many,²⁻⁷ only three cases of vaginal injury due to the "Jet Ski douche" have been previously reported.⁸⁻¹⁰ We introduce the first case that can be attributed to the force of the water jet alone. It involved a vaginal laceration without perforation into the abdominal cavity.

Report of a Case

The patient, a 31-year-old woman, gravida 1, para 1, was seated behind her husband on a Jet-Ski as it was launched from the shallow waters near the edge of Lake Mead. Before any forward velocity could be attained, she fell backward into the water with legs abducted and was struck directly in the perineal area by the thrust of the water jet. She was wearing a two-piece bathing suit and had been drinking alcoholic beverages before the accident. Profuse vaginal bleeding was noted immediately, and the patient lost consciousness. She was taken back to shore but for unknown reasons, 90 minutes elapsed before the patient received any

emergency care in the field. When emergency medical personnel arrived, the patient was conscious, her pulse was rapid and weak, and her blood pressure was difficult to obtain. During the initial management, which included the placement of perineal packs and military antishock trousers, the patient lost and regained consciousness four times. After being stabilized, the patient was airlifted to the Las Vegas University Medical Center Trauma Department for definitive treatment. During the air transport, the patient was hypotensive with a blood pressure of 74/44 mm of mercury but responded well to a fluid challenge of 1,500 ml of a normal saline solution.

In the trauma resuscitation area, the patient was found to have a blood pressure of 106/56 mm of mercury, a pulse rate of 131 beats per minute, and a respiratory rate of 29 per minute. She had primarily perianal and vulvar pain and vomited once while in the resuscitation area. The findings of a physical examination were surprisingly unremarkable, showing only pale conjunctivae and a large blood clot in the vaginal pubic hair. No obvious external laceration or bruises were present, and abdominal pain was minimal with no rebound or guarding on examination. A vaginal examination with the use of a speculum revealed active vaginal bleeding of an undetermined location. Laboratory studies revealed a hemoglobin level of 90 grams per liter (9.0 grams per dl), a hematocrit of 0.27 (27.4%), and a leukocyte count of 3.5×10^9 per liter (3,500 per μ l). The results of a computed tomographic scan of the abdomen and pelvis were indeterminate because of free air in the rectum or around the uterus. At this juncture, a gynecologic consultation was obtained. It was felt that a more thorough assessment and repair could be done under anesthesia; therefore, the patient was taken to surgery by the trauma surgery team.

In the operating room, rigid sigmoidoscopy was completed, and no evidence of a colorectal injury was found. A comprehensive vaginal examination revealed a 5-cm (2-in) deep laceration that extended around the cervix on the left lateral vaginal wall from the 12-o'clock to the 6-o'clock position. No evidence of perforation into the abdominal cavity was noted. A Penrose drain was placed and the wound closed using a 0 chromic suture.

Postoperatively, the patient's hemoglobin level and hematocrit had fallen to 56 grams per liter (5.6 grams per dl) and 0.16 (16.2%), respectively, and 3 units of blood were transfused. On postoperative day 2, a fever developed and, the patient was treated with disodium cefotetan and metronidazole hydrochloride. The remainder of the hospital stay was without complications. The patient was discharged home on postoperative day 4 with a regimen of doxycycline hyclate, metronidazole, and iron. There were no adverse sequelae.

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From the Department of Emergency Medicine, University Medical Center of Southern Nevada, Nevada.

Reprint requests to Dale Carrison, DO, FACEP, Director, Emergency Department University Medical Center, Las Vegas, Nevada 89102.

Discussion

Although injuries from water sports vary in severity and presentation,² this case represents a unique vaginal injury resulting solely from the blast of a high-pressure water jet. Two similar cases have involved a twofold mechanism of injury: falling into the water at high speeds in addition to the blast of a water jet.^{8,9} Injuries in a third reported case are presumed to be due to the blast of a high-pressure water jet, but the mechanism is not elaborated.¹⁰ In addition, this case represents a massive hemorrhage without visceral perforation and without a dramatic emergency department presentation. Important aspects to be contemplated by treating physicians include the treatment of possible infection, the possibility of sexual abuse, a careful approach to vaginal examination in the light of a sometimes subtle presentation, and the effects of alcohol on an injured patient.

Concerning infection, some authors have avoided the prophylactic use of antibiotics after similar vaginal lacerations.³⁻⁵ Rodgers reports, however, that wounds contaminated with vaginal secretions are considered "high risk" and probably are an indication for antimicrobial agents.¹¹ In addition to vaginal secretions, the normal flora of lake water may include many viral, protozoal, parasitic, and bacterial pathogens. The pathogens present will vary from lake to lake based on differences in water temperature, pH, and nutrient density.¹² Some of the more common waterborne enteric pathogens include *Escherichia coli*, *Shigella* and *Campylobacter* species, *Vibrio cholerae*, *Salmonella* species, *Yersinia enterocolitica*, and *Aeromonas hydrophila*.¹² Therefore, it is recommended that treating physicians be knowledgeable of the waterborne pathogens that predominate in their respective geographic area. In this patient, it was thought that the cost of antibiotics was far outweighed by the potential for infection, abscess formation, and other perilous sequelae.

Sexual abuse is a second consideration in any patient with vaginal trauma. It has been reported that a lack of obvious external trauma—that is, no bruising or swelling—may be a clue to abuse rather than trauma.⁴ Although this viewpoint is much respected, our patient's presentation was contradictory and represents a case where the physical findings were not indicative of the cause or severity of the underlying injury. A subtle presentation highlights a third aspect of this case: the findings of the speculum examination in vaginal trauma. Gray reports a case of vaginal laceration due to a water-ski douche in which "250 ml of blood gushed out of the wound" during vaginal examination.⁵ Similarly, our patient represents a case where a clot was visualized in the external pubic hair (no active bleeding), and only a history of bleeding was given. On speculum examination, however, active bleeding was noted and was most likely exacerbated or at least reinitiated by the examination. Although blood loss can be aggravated by a vaginal examination, a thorough physical examination is necessary and warranted in vaginal trauma. This includes a digital

examination and a cautious speculum examination to determine the full extent of the injury.

Last, alcohol use is a major concern in trauma patients. Patients with alcohol intoxication who are injured have more blood loss, more invasive monitoring, more operative procedures, more fluid replacement, and higher oxygen requirements.¹³ Taking this into account when gathering a history involving vaginal or other trauma may help guide a physician's expectations and treatment.

Preventing vaginal trauma due to the high-pressure water douche involves education. Instruction on operating personal watercrafts and the possible hazards associated with their use is essential. Personal watercraft have been reported to reach speeds as high as 55 miles per hour.⁹ Most are powered by a three-blade stainless-steel impeller that forces water through a jet pump. The resulting water jet ranges from 679 lb of thrust in smaller models to in excess of 862 lb of thrust in larger models (Kawasaki Motors Corporation, 900ZXi Jet Ski specifications brochure, P/N 99969-2413, 1994). This powerful water jet, if misdirected, may be fatal. Education should begin with the basics, such as safe operating techniques and the importance of protective clothing. For example, swimsuits with more than one layer of fabric, rubber wet suits,^{2-4,7} and even cutoff jeans³ may all be deterrents to a high-pressure water blast. Besides clothing, the "dead man" switch to reduce power if a driver falls off may prevent injury to the driver of a water-jet-powered device.⁹ Last, women should be cautioned on the use of tampons when engaged in water sports. It has been reported that a tampon may have a "pistonlike" effect when impacting with water and create excessive stretching forces on the vagina.¹⁴

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